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Severity assessment in CAP

# Severity assessment in community-acquired pneumonia: moving on

**Wei Shen Lim**

## The CURB65 score displays moderate to good discriminatory value in validation studies involving over 11000 patients

Severity assessment is recognised as a pivotal step in the management of community-acquired pneumonia (CAP). Consequently, much effort over the last three decades has gone into developing tools to aid this process. The Pneumonia Severity Index (PSI) was introduced in 1997 following a study in over 50 000 patients and is well established as a robust severity assessment tool in patients with CAP.[1] The CURB65 and CRB65 scores—which take account of the presence of Confusion, raised Urea (in the case of CURB65), raised Respiratory rate, low Blood pressure and age >65 years—were introduced more recently in 2003.[2] One of the main benefits of the CURB65 and CRB65 scores is their simplicity in comparison with the PSI which comprises 20 variables. A number of studies over the last 2 years have therefore sought to confirm the value of these scores in different healthcare settings.

In this issue of *Thorax*, Man *et al*[3] report a large and well conducted validation study of these three severity assessment tools—the PSI, CURB65 and CRB65 scores (***see page 348***). They recruited 1016 adults with CAP seen in the emergency department of a teaching hospital in Hong Kong and found that all three severity assessment tools performed equally well at discriminating patients into mortality risk groups. The area under the receiver operating characteristic curve (AUC) is a measure of the ability of a test to correctly classify those with and without the outcome in question, and is widely used to describe the performance of these severity assessment tools. The AUC for the PSI, CURB65 and CRB65 scores were 0.74, 0.73 and 0.69, respectively (a perfect test would have an AUC of 1).

This report raises the current total number of patients studied with respect to the performance of the CURB65 score to over 11 000 patients from nine countries: Australia, England, Hong Kong, New Zealand, Scotland, Spain, Sweden, the Netherlands and the United States.[2 4–9] The AUC for the CURB65 score across these validation studies has ranged from 0.73 to 0.87—that is, moderate to good discriminatory value. In comparing the performance of the PSI and CURB65 score, one study from the US found a small but significant difference in favour of the PSI (AUC 0.76 vs 0.81).[6] Otherwise, all the other comparative validation studies, including that by Man *et al*,[3] have found no significant difference between these two severity assessment tools.

The performance of the CRB65 score has now been studied in over 5000 patients from seven countries. It appears to be comparable to the CURB65 score with AUC values of 0.69–0.86. The CRB65 score does not require results from any laboratory investigation and is therefore suited to use in the community. However, except for one study from Germany which recruited patients from outpatient clinics,[10] most of the work with the CRB65 score has been done either in hospitalised patients or in patients initially seen in emergency departments. Further validation of this score in the primary care or community setting, where it has greatest applicability, is therefore warranted.

Some studies have tested the PSI and CURB65 score against outcome measures such as the need for ICU admission[9] or the combined outcome of mortality and/or need for mechanical ventilation and/or septic shock.[11] In these situations they perform less well. This is partly because the PSI and CURB65 scores were developed specifically to predict mortality, and also because these other outcome measures are influenced by centre-specific criteria for ICU admission and/or mechanical ventilation. This is reflected in the varying ICU admission rates in different healthcare settings; for instance, the ICU admission rate in the cohort studied by Man *et al*[3] in Hong Kong was 4% compared with 17% in a study conducted in Spain.[12] Importantly, all the validation studies performed in the last few years show that no severity assessment tool, whatever the outcome measure, is perfect (ie, has an AUC of 1), underlining the requirement always to exercise clinical judgement when applying these tools to individual patients.

In last month's *Thorax*, Barlow *et al*[7] reported a validation study in 419 patients with clinically diagnosed CAP which compared the CURB65 and CRB65 scores with two generic severity assessment tools—the systemic inflammatory response syndrome (SIRS) score and the standardised early warning score (SEWS). They found that the CURB65 and CRB65 scores performed better than the two generic scores (AUC 0.78 for CURB65, 0.73 for CRB65, 0.68 for SIRS and 0.64 for SEWS).

The value of disease-specific severity scores compared with generic severity scores has been a subject of some debate, particularly in the US where severity adjustment scores have been used alongside managed care. The premise underlying generic scores is that illness severity is a universal concept based on derangements in physiology. Therefore, generic scores allow comparison of patients across different diseases. Conversely, disease-specific scores are based on the

concept that individual diseases exhibit unique characteristics. Taking these characteristics into account should enable a more accurate assessment of disease severity. Numerous examples exist of disease-specific scores that outperform generic scores,[13 14] including the PSI in the context of patients hospitalised with CAP.[15] The study by Barlow *et al* extends this view to CURB65 in relation to SEWS and SIRS. However, the patient cohort in this study differs from other CAP cohorts in two substantial ways: (1) only 52% of the patients had chest radiographic confirmation of pneumonia and (2) the overall mortality of the cohort was high (19%) compared with other CAP studies such as the study by Man *et al*[3] in which the mortality rate was 8.6% (mean age of the cohorts was 74 years and 72 years, respectively). Confirmation of these findings in a separate cohort is therefore desirable.

Generic scores such as SIRS and SEWS have their roots in critical care and anaesthesia. These areas of medicine manage patients with diverse surgical and medical illnesses. The use of generic scores to triage and assess a wide case-mix of patients in a standardised manner is helpful. However, when managing an individual patient with a specific disease, they should be used alongside disease-specific severity scores that are likely to be more accurate, as is the case for CAP.

Where to from here? In the assessment of CAP we now have two validated tools that are reasonably good at stratifying patients according to mortality—the PSI and the CURB65 score. Each of these tools has advantages and disadvantages.[16 17] Centres should therefore adopt the tool that best suits the local healthcare setting. With regard to research, further validation of these tools in different patient cohorts, though desirable, should not detract from the pressing need to determine whether the use of severity assessment tools in the management of CAP ultimately leads to improved clinical outcomes.[18] Such intervention studies are needed if optimal management strategies for patients in different prognostic groups are to be defined.

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Cystic fibrosis/bronchiectasis exacerbations

# Pulmonary exacerbations in cystic fibrosis and bronchiectasis

**J S Elborn, S C Bell**

## A series of papers reviewing pulmonary exacerbations in CF and bronchiectasis

In the current (***see page 360***) and forthcoming issues of *Thorax* we are publishing a series examining current practice and evidence of the epidemiology and pathogenesis, prevention and treatment of pulmonary exacerbations in patients with cystic fibrosis (CF) and bronchiectasis.[1–4] This follows on from a recent series examining aspects of exacerbations of chronic obstructive pulmonary disease and asthma. These reviews involved authors from Australia, USA and the UK, and each has considered the topics from both a paediatric and adult perspective. Several themes emerge in these reviews, including: (1) the challenges of diagnostic precision of definitions of respiratory exacerbations; (2) the need to develop new and/or novel endpoints for therapeutic trials for the treatment of exacerbations; and (3) the urgent need for multicentre studies to investigate both preventive and therapeutic interventions for patients with CF and bronchiectasis.

Goss and Burns highlight recent studies which have used definitions of